

CLAIMS

What is claimed is:

1. A process for manufacturing composite structural insulated panels comprising the steps:

sequentially transporting lower boards via a conveying system through an application zone where a catalyzed foam mixture is applied to one face of each successive lower board;

sequentially depositing upper boards over the catalyzed foam mixture as it expands while the lower boards are transported from the application zone via the conveying system; and

continuing to transport the lower boards, expanding foam mixture, and upper boards via the conveying system through a curing apparatus such that structural insulated panels are formed having a foam core of a selected thickness that is adhered to upper and lower boards.

2. The process of claim 1, wherein a lower board placement device is used to position the lower boards on the conveying system.

3. The process of claim 2 wherein an upper board placement device is used to sequentially deposit upper boards on the catalyzed foam mixture as it expands while the lower boards are transported from the application zone via the conveying system.

4. The process of claim 1, wherein upper and lower boards selected from the group comprising oriented strand board, gypsum board, plywood, waferboard, or any combination thereof are sequentially transported and sequentially deposited, respectively.

5. The process of claim 1, wherein upper and lower boards having a thickness of 7/16 inch (11.1 mm) are sequentially transported and sequentially deposited, respectively.

6. The process of claim 1, wherein a catalyzed foam mixture to form a polyurethane or polyisocyanurate foam is applied to one face of each successive lower board.

7. The process of claim 2 wherein the lower boards are placed on a conveyor using the lower board placement device and the conveyor transports the lower boards through the foam application zone.

8. The process of claim 3 wherein the lower boards are placed on a conveyor using the lower board placement device, the conveyor transports the lower boards through the foam application zone and the conveyor transports the lower boards with the catalyzed foam mixture applied thereon through the upper board placement device.

9. The process of claim 8 wherein the conveyor transports the lower boards with the catalyzed foam mixture applied thereon and the upper boards deposited thereon through the curing apparatus.

10. The process of claim 9 wherein the conveyor moves continuously at a rate of 20 to 60 ft./min.

11. The process of claim 10 wherein a catalyst is mixed with other foam making ingredients as a last mixing step before depositing the catalyzed foam mixture onto the lower boards.

12. The process of claim 10 wherein the sequentially transported lower boards maintained at a spaced separation and are positively driven by buttresses that project from the conveyor.

13. The process of claim 1 wherein supporting guide rails are used to keep the upper boards at a desired height and placement above the lower boards.

14. The process of claim 1 wherein continuing to transport the lower boards, expanding foam mixture, and upper boards via the conveying system through a curing apparatus comprises transport through heating and cooling sections of the conveying apparatus.

15. The process of claim 1 further comprising trimming the structural insulated panels and cutting them into pieces of a desired size.

16. An apparatus for manufacturing structural insulated panels comprising:
a conveyor for sequentially transporting lower boards through an application zone where a catalyzed foam mixture is applied to one face of each successive lower board and subsequently through a curing apparatus;

a lower board placement device that sequentially places lower boards onto the conveyor in advance of the application zone;

a foam application system that applies the catalyzed foam mixture to lower boards as they are conveyed through the application zone;

an upper board placement device that sequentially places upper boards over the catalyzed foam mixture as it expands while the lower boards are transported from the application zone to the curing apparatus; and

the curing apparatus is configured to cure expanding catalyzed foam mixture disposed between lower boards and upper boards being transported by the conveyor such that structural insulated panels are formed having a foam core of a selected thickness that is adhered to upper and lower boards.

17. The invention of claim 16 further comprising a trimmer device that removes portions the lower boards, the upper boards, and/or foam from the structural insulated panels that exit the curing apparatus.

18. The invention of claim 16 further comprising a side wall positioned along the conveyor and near the upper board placement device for preventing foam from escaping between the upper boards and the lower boards when an upper board is placed onto a lower board with foam applied thereon.

19. The invention of claim 16 wherein the upper and lower board placement devices are configured to place onto the apparatus rigid upper and lower boards that are selected from the group comprising oriented strand board, gypsum board, plywood, waferboard, or any combination thereof.

20. The invention of claim 16 wherein the upper and lower board placement devices are configured to place onto the apparatus rigid upper and lower boards that the same predetermined thickness.

21. The invention of claim 16 wherein the conveyor continuously moves at a rate of 20 to 60 ft./min.

22. The invention of claim 16 further comprising a foam ingredient mixing apparatus configured to mix foam ingredients for a polyurethane or polyisocyanurate foam that are then applied in the application zone.

23. The invention of claim 22 wherein the foam ingredients mixing apparatus is an extruder system having an extruder head in which a catalyst is mixed with the other ingredients.

24. The invention of claim 16 wherein the curing apparatus comprises heating and cooling sections.

25. The invention of claim 16 wherein supporting guide rails maintain the upper boards at a desired height above the lower boards until the foam is cured.

26. The invention of claim 25 wherein supporting guide rails maintain the upper boards at a desired height from three to four inches (76.2 mm - 101.6 mm) above the lower boards.

27. The invention of claim 19, wherein a plurality of buttresses project from the conveyor for spacing and positively driving lower boards traveling on the conveyor.